J. Helminthol. Soc. Wash.
63(1), 1996, pp. 110–115

Research Note

Taxonomy and Biology of *Mitotrema anthostomatum* Manter, 1963 (Digenea: Cryptogonimidae) from Fishes of the Southern Great Barrier Reef, Australia

THOMAS H. CRIBB,[1] RODNEY A. BRAY,[2] STEPHEN C. BARKER,[3] AND ROBERT D. ADLARD[4]

[1] Department of Parasitology, The University of Queensland, Brisbane 4072, Australia, e-mail: T.Cribb@mailbox.uq.oz.au,
[2] Department of Zoology, The Natural History Museum, Cromwell Road, London SW7 5BD, United Kingdom, e-mail: rab@mailserver.nhm.ac.uk,
[3] Department of Parasitology & Centre for Molecular & Cellular Biology, The University of Queensland, Brisbane 4072, Australia, e-mail: S.Barker@mailbox.uq.oz.au, and
[4] Department of Parasitology, The University of Queensland, Brisbane 4072, Australia, e-mail: paadlard@uqvax.cc.uq.oz.au

ABSTRACT: *Mitotrema anthostomatum* Manter, 1963 is redescribed from the serranid fishes *Epinephelus fuscoguttatus* and *Cromileptes altivelis* from the southern Great Barrier Reef, Australia. Distinctions of morphology and biology of these specimens in comparison with the original description are the presence of a uroproct and a distinctive lobe on the posterior margin of the ventral sucker. Metacercariae are recorded from the fish *Amphiprion akindynos, A. perideraion, Chaetodon aureofasciatus, C. pelewensis, Choerodon cyanodus, Chromis viridis, Dascyllus aruanus, Forcipiger flavissimus, Plectroglyphidodon dickii, Pomacentrus flavicauda, P. melanochir,* and *P. wardi.*

KEY WORDS: Digenea, Cryptogonimidae, *Mitotrema, Epinephelus, Cromileptes,* life cycle, Great Barrier Reef, Australia.

Mitotrema anthostomatum was described by Manter (1963) from a species of *Plectropomus* ("probably *maculatus*" according to Manter) from Fiji. Manter placed the genus in the subfamily Diplopharyngotrematinae, family Cryptogonimidae. Yamaguti (1971) transferred it to family Acanthostomidae, created the subfamily Mitotrematinae, and gave original figures of the terminal genitalia and proximal female system. The species was reported a second time by Gibson (in Lester and Sewell, 1989) from *Cromileptes altivelis* at Heron Island on the Great Barrier Reef. Here we report a new host record of adults and describe the metacercaria of this species.

All collections were made at the Heron Island and Wistari reefs on the southern Great Barrier Reef (23°27′S, 151°55′E). Trematodes were collected from freshly killed fish, fixed by pipetting them into nearly boiling 5% formalin, stained with Mayer's acid haemalum, cleared with methyl salicylate, and mounted in Canada balsam. Drawings were made with the aid of a camera lucida. Measurements are quoted as range with mean in parentheses and are in micrometers. The following abbreviations are used: BM(NH), The Natural History Museum, London; QM, Queensland Museum, Brisbane; USNPC, United States National Parasite Collection, Beltsville, Maryland.

Over several years at Heron Island we have examined specimens of 15 species of Serranidae as follows: 18 *Cephalopholis boenak,* 5 *C. cyanostigma,* 19 *C. miniatus,* 1 *Cromileptes altivelis,* 6 *Diploprion bifasciatum,* 5 *Epinephelus cyanopodus,* 30 *E. fasciatus,* 2 *E. fuscoguttatus,* 1 *E. merra,* 13 *E. ongus,* 34 *E. quoyanus,* 1 *E. undulatostriatus,* 34 *Plectropomus leopardus,* 1 *P. laevis,* and 1 *P. maculatus. Mitotrema anthostomatum* was found only in the 2 *E. fuscoguttatus* and the single *C. altivelis.*

Mitotrema anthostomatum Manter, 1963 (Figs. 1–3, Table 1)

REDESCRIPTION (based on 16 specimens; measurements in Table 1): Body very elongate, narrow. Forebody short, widest at level of ventral sucker. Hindbody narrows abruptly anteriorly and then widens gradually to level of gonads. Body surface covered with regular quincunxial array of closely packed minute spines, reach to posterior extremity. Oral sucker large, infundibuliform, with 6 muscular lobes (2 ventral, 2 lateral, 2 dorsal). Prepharynx long, narrow, with uniform breadth, wrinkled posteriorly. Pharynx subglobular. Esophagus short. Intestinal bifurcation immediately posterior to ventral sucker.

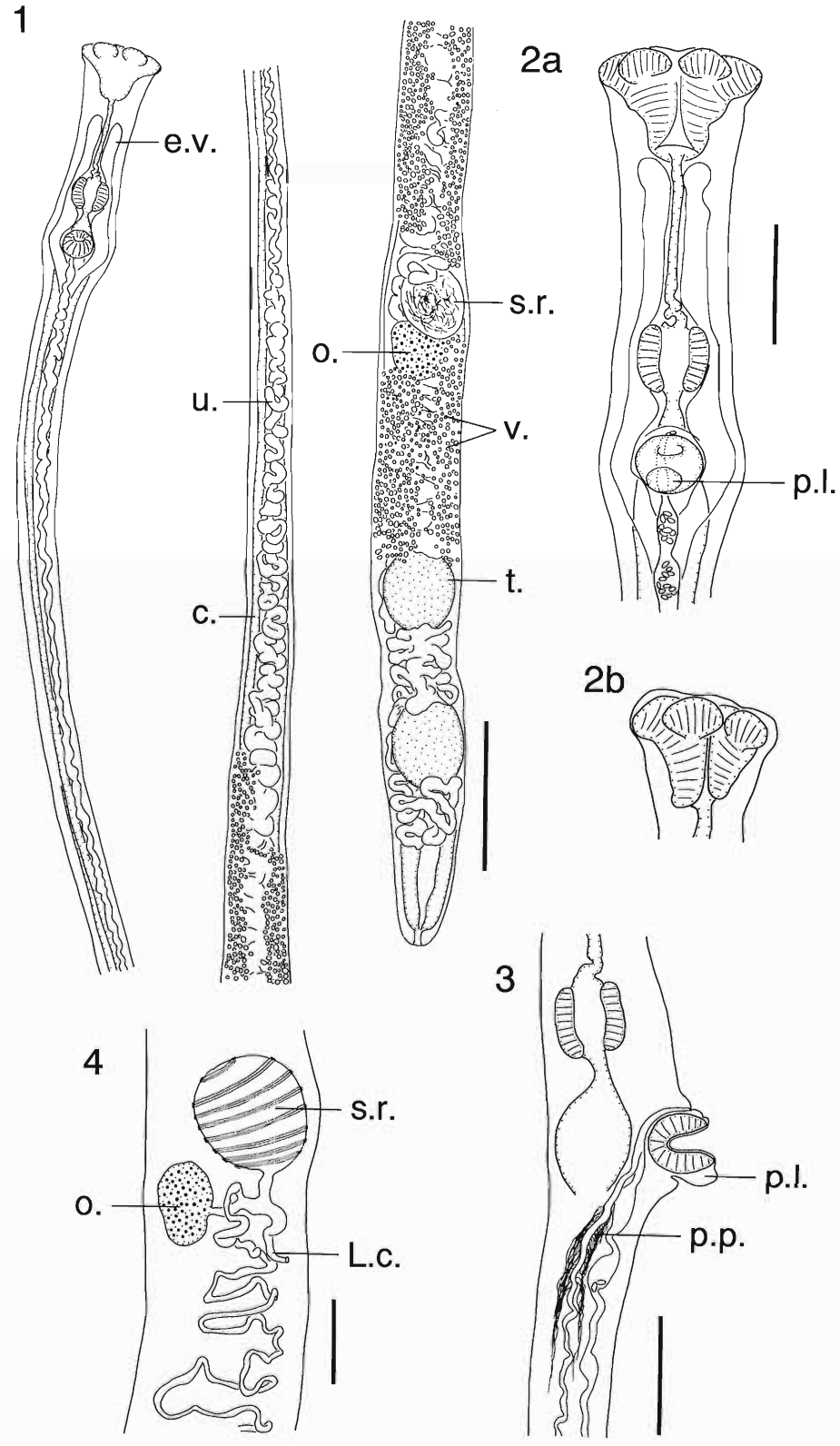
Table 1. Measurements of adult specimens of *Mitotrema anthostomatum* (in micrometers).

Host:	*Plectropomus* (prob) *maculata* (Manter, 1963) $N = 5$	*Cromileptes altivelis* (Queensland) $N = 2$	*Epinephelus fuscoguttatus* (Queensland) $N = 5$	Metacercaria (Queensland) $N = 5$
Length (L)	8,930–13,908	7,184–11,344	8,320–9,152	7,500–9,380
Width (W) VS	334–368	334–336	244–308	225–395
Width as % of L		3.23–4.65	2.67–3.09	2.63–4.21
Forebody (FB)	608–931	672–800	648–848	636–713
FB as % of L		7.05–9.35	7.08–8.56	6.94–9.08
Oral sucker L		154–173	193–225	148–218
W	241–368	199–205	212–302	180–218
Prepharynx L	268–335	212–244	244-308	231–308
Pharynx L	120–167	90–100	106–112	83–116
W	94–120	83–90	106–116	87–103
Esophagus L	30–40	26	19–58	
Ventral sucker L	114–154	83–96	100–116	90–96
W		96	106–116	96–103
Sucker width ratio	1:0.41–0.45	1:0.47–0.48	1:0.38–0.50	1:0.44–0.57
VS-ovary L (VS-Ov)		4,925–7,680	5,712–7,856	4,969–6,696
VS-Ov as % of L		68–69	66–70	66–73
Anterior extent of Vitellarium to Ov (Vit-Ov)		688–1,600	1,120–1,712	
Vit-Ov as % of VS-Ov		14–21	19–27	
Ovary L		167–244	183–250	87–116
W		148–225	148–199	58–148
Ov to anterior testis		352–912	464–768	443–571
Anterior testis L		212–353	263–385	176–212
W		212–321	225–295	119–177
Anterior testis to posterior testis		160–225	199–244	186–257
Posterior testis L		257–414	282–443	186–241
W		244–347	231–308	122–180
Posttesticular region L (PTR)	608–850	376–565	475–668	398–533
PTR as % of L		4.98–5.23	5.34–6.17	4.66–6.51
Eggs L × W	20–24 × 9–11	19 × 10	18–20 × 8–10	

Ceca may be distended in wide part of body at ventral sucker level, narrow in anterior hindbody, form uroproct at posterior extremity. Ventral sucker small, rounded, with distinctive lobe on its posterior margin (Figs 2a, 3).

Testes 2, subglobular to oval, tandem, separated by uterus, relatively close to posterior extremity. Seminal vesicle reaches from immediately anterior to seminal receptacle, initially relatively broad tubular, narrows abruptly passing through thicker-walled narrow duct into relatively broad saccular portion before narrowing to become very long, narrow, sinuous duct reaching to just posterior to ventral sucker; unites with metraterm at about level of posterior edge of ventral sucker. Pars prostatica at anterior end of seminal vesicle, indistinctly defined except for openings of prostate cells (Fig. 3); prostate cells extensive along at least 250 μm of length of seminal vesicle. Genital sinus long, narrow, runs over dorsal surface of ventral sucker. Genital pore median, immediately anterior to ventral sucker.

Ovary subglobular to oval, pretesticular, separated from testes by uterus, very distant from ventral sucker; oviduct leaves dorsal surface. Seminal receptacle subglobular, as large as or much larger than ovary, immediately anterodorsal to ovary; spiral bands of thickened muscle in wall. Mehlis' gland prominent, dorsal to ovary. Laurer's canal short, opens dorsally to ovary, surrounded by gland cells, shares short common duct with seminal receptacle. Uterus passes posteriorly from ovary, filling space between ovary and testes, between testes and posttesticular region, then passes forward with subregular lateral slings in posterior half of ovary–ventral sucker region and narrow, undulating course distally; metraterm not differentiated. Eggs small, numerous; weakly tanned in region of uterus between ovary and posterior extremity; tanning in-



tensity (as seen by change of color from yellow to brown) increases from posterior extremity to about posterior testis; eggs in single file in distal narrow part of uterus. Vitelline follicles small, numerous; in two separated fields from seminal receptacle anteriorly for about one fifth of ovary–ventral sucker distance; second field from ovary to anterior testis; field continuous around dorsal surface of worm.

Excretory vesicle Y-shaped; bifurcation just posterior to posterior testis; arms passing ventral to intestinal ceca, extending to near oral sucker. Uroproct terminal.

MATERIAL EXAMINED (all Heron Island): *Cromileptes altivelis* 2, Jan. 1991; *Epinephelus fuscoguttatus* 10, including one set of transverse sections, Jan. 1992; 4, including two sets of sagittal sections, Jan. 1993.

SITE OF INFECTION: Small intestine.

SPECIMENS DEPOSITED: Queensland Museum QM G 211566–211572; BM(NH) 1980.2.25.1-15; USNPC 84996.

Metacercaria
(Figs. 4, 5)

Dissections of a wide range of small fish at Heron Island revealed metacercariae clearly attributable to *M. anthostomatum* in 12 species from 3 families. The metacercariae are tightly coiled in near-spherical cysts in the musculature.

MATERIAL EXAMINED (all from Heron Island): Chaetodontidae—*Chaetodon aureofasciatus* 1, Jan. 1991; *C. pelewensis* 5, Jan. 1991; *Forcipiger flavissimus* 1, Jan. 1991. Pomacentridae—*Amphiprion akindynos* 6, Jan. 1991; *A. perideraion* 2, Jan. 1991; *Chromis viridis* 1, Jan. 1991; *Dascyllus aruanus* 1, Jan. 1991; *Plectroglyphidodon dickii* 1, Jan. 1991; *Pomacentrus flavicauda* 1, Mar. 1985; *P. melanochir* 3, Mar. 1985; *P. wardi* 1, 1985; 3, Mar. 1985. Labridae—*Choerodon cyanodus* 2, Nov. 1989.

SPECIMENS DEPOSITED: QM G 211573–211583.

DESCRIPTION (measurements in Table 1): Body in adult form and near adult size. Digestive system fully developed. Reproductive system fully developed except for absence of vitelline follicles. Egg-forming complex distinguishable except for vitelline reservoir. Spiral muscular thickening on seminal receptacle distinctive and far more prominent than in adult.

We here identify the present specimens as *Mitotrema anthostomatum.* In comparisons between our specimens and the description and figures given by Manter (1963) and from examination of a paratype specimen (USNM No. 59860) we found no significant differences except in a few details which Manter appears to have overlooked (presence of a uroproct and the distinctive lobe on the posterior margin of the ventral sucker). Nevertheless, this identification is made with some reservations. Notes of Professor H. W. Manter given to Professor J. C. Pearson indicate that he collected specimens of *Mitotrema* from *Cromileptes altivelis* when he visited Australia in 1963 and that he considered them distinct from *M. anthostomatum.* Although we can find no basis for this view ourselves, Manter obviously had access to the original specimens, so his opinion is worth noting.

We prefer to recognize *Mitotrema* within the Cryptogonimidae because we can find no strong basis for the recognition of the Acanthostomidae as a separate family.

Two specimens of *Cromileptes altivelis* (ours and that of Dr D. I. Gibson of The Natural History Museum, London) and 2 specimens of *Epinephelus fuscoguttatus* examined from Heron Island on the southern Great Barrier Reef were infected with *Mitotrema anthostomatum.* This is in contrast to the 168 specimens of 13 other species of Serranidae from the same location that were not infected with this species. All these serranids are carnivores and presumably most eat at least some of the wide range of pomacentrids and chaetodontids that we have identified as the intermediate host of this parasite. Therefore, this parasite appears to have high host-specificity for its definitive hosts even though *Cromileptes altivelis* and *Epinephelus fuscoguttatus* are not

←

Figure 1. ***Mitotrema anthostomatum,*** **adult, ventral. Scale bar = 0.5 mm. Abbreviations: c. = cecum, e.v. = excretory vesicle, o. = ovary, s.r. = seminal receptacle, v. = vitelline follicles, t. = testis, u. = uterus.**

Figures 2–4. 2a. Oral sucker and terminal genitalia, ventral. 2b. Oral sucker, lateral. Scale = 0.2 mm. 3. Terminal genitalia, lateral. Scale = 0.2 mm. 4. Egg-forming complex of metacercaria. Scale bar = 0.1 mm: Abbreviations: L.c. = Laurer's canal, o. = ovary, p.l. = posterior lobe, p.p. = pars prostatica, s.r. = seminal receptacle.

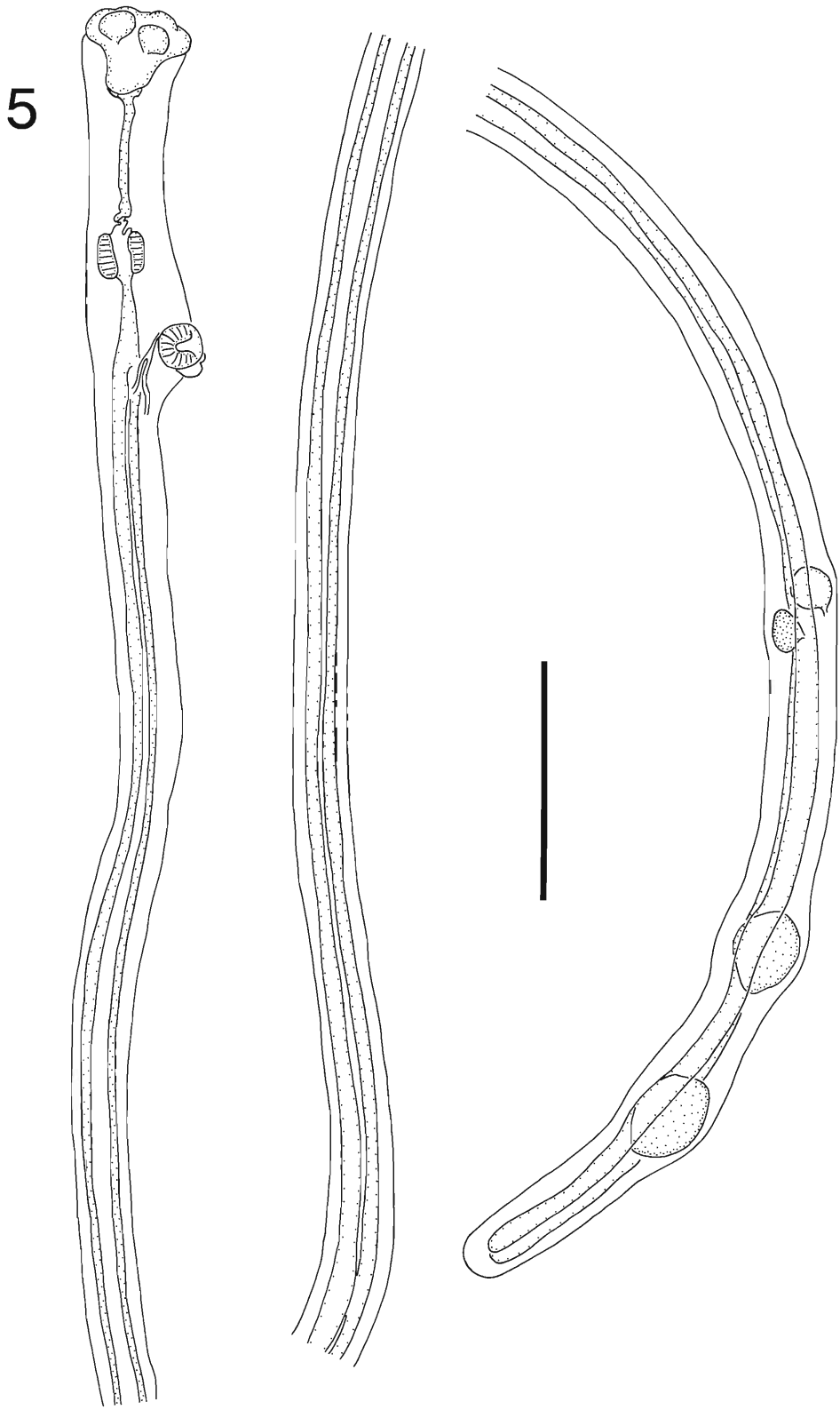


Figure 5. Metacercaria of *Mitotrema anthostomatum*. Scale bar = 0.5 mm.

closely related. This implies that the host-specificity is physiological rather than ecological. This in turn raises a problem because Manter recorded his Fijian specimens from a *Plectropomus* sp. ("prob *maculatus*") whereas our examinations of 36 specimens of 3 species of *Plectropomus* at Heron Island have not revealed any specimens of *Mitotrema* although they are undoubtedly exposed to infection. Three possible explanations present themselves: 1) the Fijian and Queensland specimens are in fact different species, 2) the same species has different host-specificity at the 2 locations, and 3) Manter recorded the identity of the host wrongly. We see no particular evidence to support any of these explanations and believe that the matter must remain unresolved for the present.

We thank Trudy Wright for assistance in the laboratory and Glenn Anderson for help in the field. This work was supported by grants from the Australian ARC and ABRS and from the Heron Island Research Station.

Literature Cited

Lester, R. J. G., and K. B. Sewell. 1989. Checklist of parasites from Heron Island, Great Barrier Reef. Australian Journal of Zoology 37:101–128.

Manter, H. W. 1963. Studies on digenetic trematodes of fishes of Fiji. III. Families Acanthocolpidae, Fellodistomatidae, and Cryptogonimidae. Journal of Parasitology 49:443–450.

Yamaguti, S. 1971. Synopsis of Digenetic Trematodes of Vertebrates. Parts I, II. Keigaku Publishing Co., Tokyo. 1074 pp. + 349 pls.

J. Helminthol. Soc. Wash.
63(1), 1996, pp. 115–119

Research Note

Immature *Polyacanthorhynchus rhopalorhynchus* (Acanthocephala: Polyacanthorhynchidae) in Venton, *Hoplias malabaricus* (Pisces) from Moca Vie River, Bolivia, with Notes on its Apical Organ and Histopathology

OMAR M. AMIN,[1,2] RICHARD A. HECKMANN,[3] VICTOR INCHAUSTY,[4] AND RENE VASQUEZ[4]

[1] Institute of Parastic Diseases, P.O. Box 28372, Tempe, Arizona 85285-8372,
[2] Department of Zoology, Arizona State University, Tempe, Arizona 85287-1501,
[3] Department of Zoology, Brigham Young University, Provo, Utah 85602, and
[4] Beni Ichthyological Project, Technical University of Beni, Trinidad, Bolivia

ABSTRACT: Cystacanths of *Polyacanthorhynchus rhopalorhynchus* (Diesing, 1851) Travassos, 1920 were discovered in the viscera of venton, *Hoplias malabaricus* (Bloch, 1794) collected from the Moca Vie River at Las Palquitas, Bolivia. Apical proboscis organ and general morphological features were similar to but less developed than those of *Polyacanthorhynchus kenyensis* Schmidt and Canaris, 1967 cystacanths from Africa. Cystacanths of *P. rhopalorhynchus* were not deeply embedded in liver tissue. A collagenous connective tissue capsule surrounded and attached the cystacanths to the liver surface. Necrosis of hepatocytes and subsequent inflammatory response were observed near encapsulated acanthocephalans. Cystacanths attached to the intestine were encapsulated in the fibroserosa.

KEY WORDS: *Polyacanthorhynchus rhopalorhynchus,* Acanthocephala, cystacanths, *Hoplias malabaricus,* paratenic host, apical organ, histopathology, Bolivia.

Amin (1987) recently erected a new order, Polyacanthorhynchida, and a new class, Polyacanthocephala, for the monogeneric family Polyacanthorhynchidae. Adults of 3 of the 4 known species of the genus *Polyacanthorhynchus* Travassos, 1920 infect South American caimans (Alligatoridae). These species are *Polyacanthorhynchus macrorhynchus* (Diesing, 1856) Travassos,